REMARKS

Applicant has amended the claims to clarify the present invention, with the contents of claims 7 and 8 now incorporated into claim 1.

Claim 1, as now amended is to a fuel cell that includes, among other features, an electrolyte membrane having (a) a cathode and a gas diffusion layer arranged in the stated order on one surface of the electrolyte membrane, and (b) an anode and another gas diffusion layer arranged in the stated order on the other surface of the electrolyte membrane. Electricity is generated when an oxidizing gas is distributed along and passed through the cathode-side gas diffusion layer and a fuel gas is distributed along and passed through the anode-side gas diffusion layer. The cathode-side gas diffusion layer is composed of a first layer and a second layer of carbon particles adhered to a fibrous base material, with the first layer being in contact with the cathode. The second layer is thicker than the first layer, and the second layer is the layer along which the oxidizing gas is distributed and through which the oxidizing gas is passed. The carbon particles of the first layer have an average specific surface area ranging from 100 m^2/g to 1000 m^2/g inclusive, and the carbon particles of the second layer have an average specific surface area of less than 100 m^2/g. The cathode-side gas diffusion layer is made up of the first and second layers, and has a water retention capacity ranging from 0.5 mg/cm^2 to 1.5 mg/cm^2 inclusive, and a water retention density ranging from 0.05 g/cm^3 to 0.5 g/cm^3 inclusive. Such a fuel cell is not taught or suggested in the cited reference.

Reconsideration and removal of the rejection of claim 1 as anticipated by Wood III, et al. (U.S. 6,350,539) and as obvious in view of that reference are respectfully requested in view of the present amendments to the claims and the following remarks.

In the arrangement as now defined in claim 1, the fuel cell is able to keep the water retention capacity in the cathode-side gas diffusion layer within the appropriate range of 0.5 mg/cm^2 to 1.5 gm/cm^2, while the second layer properly takes in the oxidizing gas and supplies the ionized oxidizing gas for the electrolyte membrane via the first layer. At this time, the gas diffusion layer has a water retention effect at an appropriate level, and also the gas molecules that have been efficiently ionized, by the carbon particles having the average specific surface area within the range of 100 m^2/g to 1000 m^2/g inclusive, reach the electrolyte membrane with moisture. Thus, the cell reaction in the electrolyte membrane is smooth, and results in a higher performance of the fuel cell.

The cited reference, Wood III, discloses a fuel cell in which the gas diffusion layer has a two-layer structure, and the pore size of the layer on the electrolyte membrane side (the absorption layer) is smaller than that of the desorption layer which is laminated over the absorption layer, and also the average specific surface area of the absorption layer is greater than that of the desorption layer.

Wood III, however, does not teach or suggest the water retention capacity, as is now claimed in claim 1 of the present application. In this respect, the reference is quite distinct from the present invention.

Also, the Office Action mentioned a technical challenge with a solid polymer-type fuel cell to realize properties of both (i) the humidification of the electrolyte membrane and (ii) sufficient

amount of gas supply. Based on this, the Office Action alleged that optimization of water retention capacity is a matter of design, and a gas diffusion layer having a multi-layered structure is able to solve this problem.

Applicant would point out, however, that since water retention and gas permeability contradict with each other, these properties need to be present along with the thickness direction of the laminated layers, in order to use these layers as gas diffusion layers of a fuel cell. In order to seek optimal ranges for the specific surface area of carbon particles and the water retention capacity that satisfy both of those properties, it is required to have experiments with various levels of water retention capacity and water retention density. Accordingly, the invention claimed in Claim 1 would not have been achieved with ordinary experiments.

Thus, the solution that satisfies both of those properties is not "a matter of design", as the Office Action suggests. The solution requires many experiments which consider water retention and gas permeability. It is not possible to disclose a technology by merely mentioning an ideal configuration. It is clear from the fact that although Wood III mentions a preferable situation where those properties are balanced (col. 13, line 65 etc.), it does not disclose in detail how to actually achieve the preferable situation. The unobvious numerical ranges claimed in amended claim 1 were obtained as a result of advanced research and study, namely the ranges for the water retention density of the gas diffusion layer and the specific surface area of the carbon particles.

Consequently, even with a motivation from the reference by Wood III, it is extremely difficult for a person skilled in the art to arrive at the claimed invention of claim 1.

With respect to the contents of claim 6, it does not matter whether "furnace black" or "acetylene black" are both carbon black materials or not. The Applicant is entitled to specify the specific carbon black material (acetylene or furnace) in the claim as specific "carbon particles" claimed in Claim 5, upon which Claim 6 is dependent.

In view of the aforementioned amendments and accompanying remarks, claims 1, 2, 5 and 6, as amended, are believed to be in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP

William G. Kratz, Jr.
Attorney for Applicant
Reg. No. 22,631

WGK/nrp
Atty. Docket No. **020057**
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930

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PATENT TRADEMARK OFFICE